Quiz 5

No notes are allowed, but you may use a calculator for numerical work only (no graphing). Be sure to show all your work- your reasoning is very important.

1. Compute the following limits, if they exist:

    (a) $\lim\limits_{t \to 0} \dfrac{e^{2t} - 1}{\sin(t)}$

   (b) $\lim\limits_{x \to 1} \dfrac{x^2 + x + 1}{x + 2}$

    (c) $\lim\limits_{x \to \infty} \dfrac{3x^2 + 2x + 1}{5x^2 + 2}$

2. There are two positive numbers that sum to 100. What is the maximum possible product of the two numbers?

3. Find the absolute maximum and absolute minimum of $f(x) = x^3 - 3x^2 + 1$ on the interval $[-\frac{1}{2}, 4]$

4. Let $f(x) = x^3 - 3x^2$. Use sign charts to determine the intervals on which f is increasing, decreasing, concave up, and concave down.

5. We want to construct a rectangle with its base on the x−axis and its upper corners on the parabola $y = 1 - x^2$. One such possible rectangle is shown in the figure below. What are the dimensions of the rectangle that gives the greatest possible area?
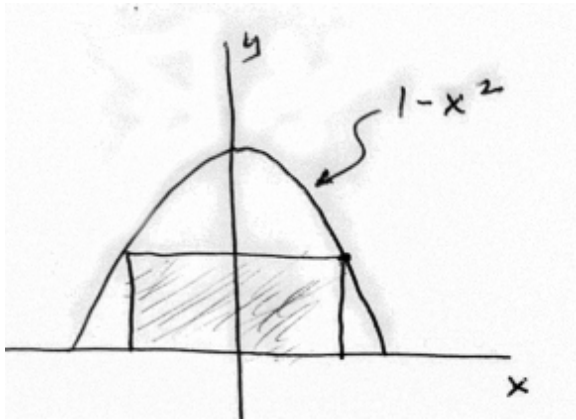
6. A farmer wants to build a rectangular fenced area containing 5 pens along a river. Because of the river, the farmer only needs to fence off three sides (see below). If the farmer has 300 ft total fencing, how should the fence be built to maximize the enclosed area?